United States Department of Agriculture

Forest Service

North Central Forest Experiment Station

Research Paper NC-214

Unstaffed Trail Registration Compliance

in a Backcountry Recreation Area

Earl C. Leatherberry and David W. Lime

ACKNOWLEDGMENT

The authors acknowledge the assistance of Harold Aronson, caretaker of McCormick Experimental Forest who serviced equipment used in the study; Thomas Sweet, former District Ranger, Kenton Ranger District, Ottawa National Forest, and other District personnel who provided the bulletin board, maps, and other materials used in the study; and Curtis Bowley and James Oesterle, who served as field technicians in 1978 and 1979, respectively.

North Central Forest Experiment Station
U.S. Department of Agriculture—Forest Service
1992 Folwell Avenue
St. Paul, MN 55108

Manuscript approved for publication November 20, 1980
1981

UNSTAFFED TRAIL REGISTRATION COMPLIANCE IN A BACKCOUNTRY RECREATION AREA

Earl C. Leatherberry,
Geographer,
and **David W. Lime,**
Research Social Scientist

Nationwide, people are increasingly using trails to enjoy the out-of-doors. According to the Heritage Conservation and Recreation Service (formerly the USDI Bureau of Outdoor Recreation 1967; 1973), the number of people taking nature walks increased from 20 to 34 million between 1965 and 1972, while backpackers increased from an estimated 10 to 12 million. Participation in other trail activities such as horseback riding and off-road vehicle use also has greatly increased (Lucas and Rinehart 1976).

Many trails are on public and private land best described as "backcountry" and ranging from designated Wilderness Areas to agricultural or even urban fringe environments that convey a "wild" feeling. Most backcountry recreation areas provide opportunity for dispersed, away-from-the-road activities.

Resource managers need information on how and by whom trails are used and also on use trends to determine the necessity of trail facilities, the kinds and locations of desired facilities, and the maintenance and law enforcement schedules needed. Managers often rely on unstaffed, self-issuing trail registers to secure such information. The trail user is asked to complete either a "mandatory" or "voluntary" registration form. Until fairly recently, voluntary guestbooks were often used. Now, a registration card system is used more often.

Unstaffed trail registers have been used for many years by the U.S. Forest Service, particularly in Wildernesses and Primitive Areas, and on National Park Service trails. Information collected often includes group size, travel route or destination, length of stay, method of travel, activities participated in, and the group leader's name and address. Registers normally are located at or near trailheads—not at a central registration point such as a ranger station or visitor center. They are relatively inexpensive to install and maintain, and their operation requires no staffing increase.

The problem with such a system is that not all people register. While voluntary trail registration compliance on backcountry trails can be high—an 89 percent compliance rate was recorded in Colorado's Rawah Wilderness (James and Schreuder 1972)—it can be low too. Only 28 percent of the groups entering the Selway-Bitteroot Wilderness in Montana (Lucas, 1975) complied with voluntary registration requests.

Are unstaffed trail registers really effective in securing information from trail users? Are some types of visitors more likely to register than others? Are some trail register designs and locations more effective than others?

To answer these questions, we present findings from a study that monitored compliance continuously at an unstaffed trail register in an upper midwestern backcountry area. The study was designed to evaluate the effectiveness of unstaffed trail registers in securing information from backcountry recreationists. Two kinds of self-issued registration forms—mandatory and voluntary—were evaluated. Also, to determine factors influencing registration compliance or noncompliance certain characteristics of visitor groups and their use patterns were delineated to determine their possible relation to compliance. The characteristics were: group size, dominant recreation activity pursued, season of visit, time of day the visitor entered the area, and length of stay. A study using similar methods has been completed by the Intermountain Forest and Range Experiment Station, Forestry Sciences Laboratory, Missoula, Montana (Lucas and Kovalicky 1981).

STUDY AREA

Compliance with registration requirements at an unstaffed trail register was tested on the Cyrus H. McCormick Experimental Forest in the upper Peninsula of Michigan (fig. 1). The Forest is about 40 miles

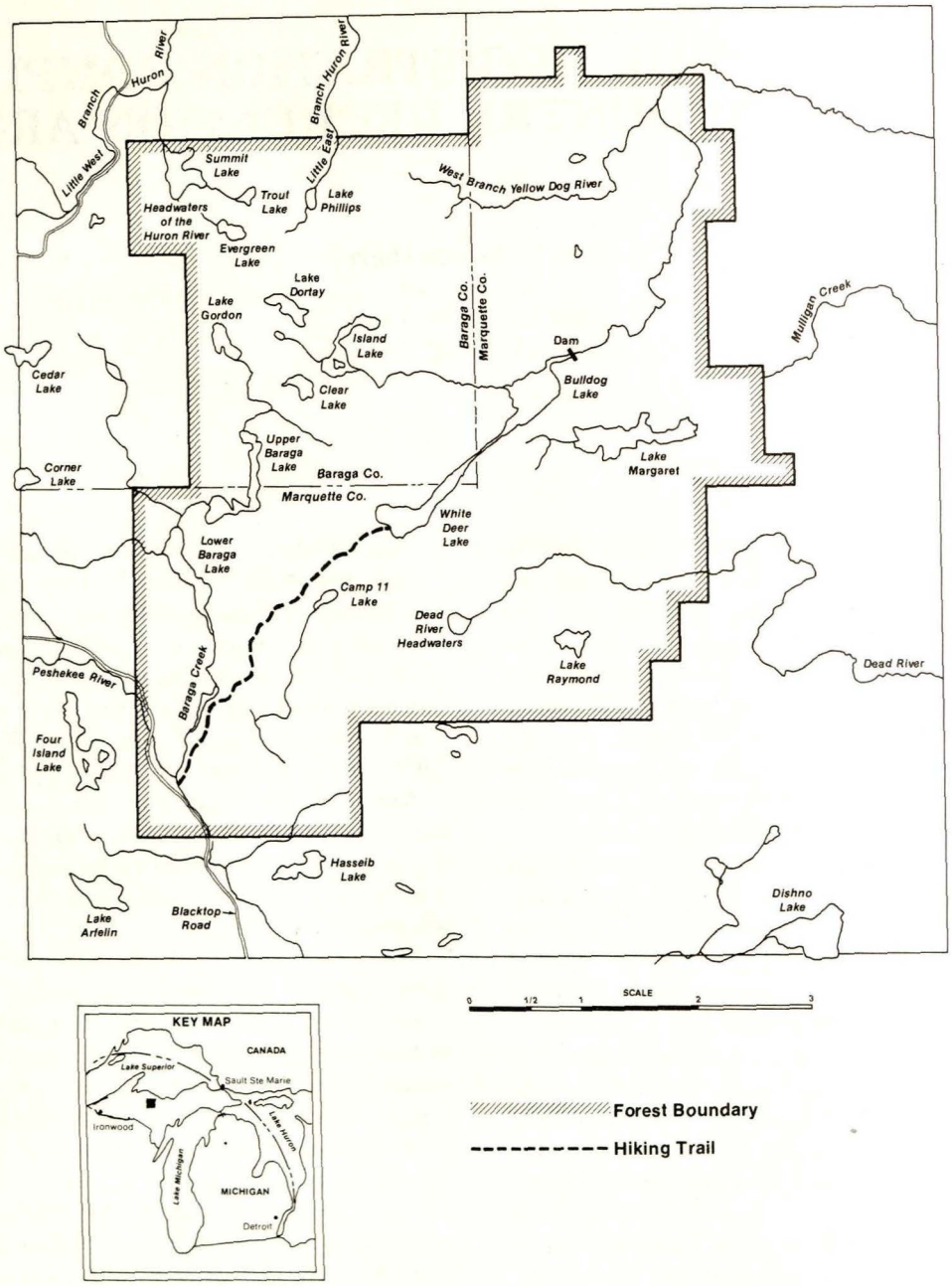

Figure 1.—*Cyrus H. McCormick Experimental Forest, Ottawa National Forest.*

west of Marquette and was deeded to the U.S. Forest Service in 1969 for research purposes. The Forest is administered by the Ottawa National Forest and the North Central Forest Experiment Station.

The Forest is a 17,124 acre roadless area with several large lakes and numerous small lakes and streams (fig. 2). The topography is rolling to rugged with rock outcrops common; vegetation types are varied. The area is designated for day-use recreation only, and hiking is the predominant recreational pursuit. There are about 125 miles of hiking trails on the Forest, but many are not maintained and are in poor condition.

The unstaffed trail register was located on the most heavily used trail in the southwest quadrant of the Forest (fig. 1). The 3-mile trail, leading from a paved county road, follows the old road to the former McCormick estate (fig. 3). At least 90 percent of the visitors enter and exit here.

Figure 2.—*Island Lake and surrounding terrain is typical of the environment in the McCormick Experimental Forest.*

Figure 3.—*A 3-mile unpaved road is the main hiking trail on the Forest. Most visitors enter and exit the Forest using this road.*

STUDY PROCEDURES

Registration compliance was monitored from August 4 to September 30, 1978, and from May 22 to October 15, 1979. During the 1978 period, 83 groups entered the area while in the 1979 period, 241 groups entered.

The trail register was a bulletin board, located approximately 400 feet up the trail and out of sight of the parking area (fig. 4). Affixed to the board was a box; the top half contained registration materials (forms, pencils, and calendar) and the bottom half served as a depository for completed forms (fig. 5). Also attached to the board was a plastic laminated map of the Forest, rules and regulations, and signs stating registration instructions.

Two registration forms were evaluated: (1) a self-issued "mandatory" form and (2) a self-issued "voluntary" form (fig. 6). As implied, the completion of the self-issued mandatory form was required. The instructional sign focused on the obligatory nature of the requirement and read, "One Person From Each Group **Must Register** Here." A group-designated leader was to complete the permit-like form, deposit one copy of the form at the register, and carry the other while in the area. This form, called the Self-issuing McCormick Permit, should not be confused with the mandatory permit often required in designated Forest Service Wildernesses. In this study the visitor did not know there was a copy of the form to be carried and possibly shown to a Forest Service officer until the form was removed from the registration

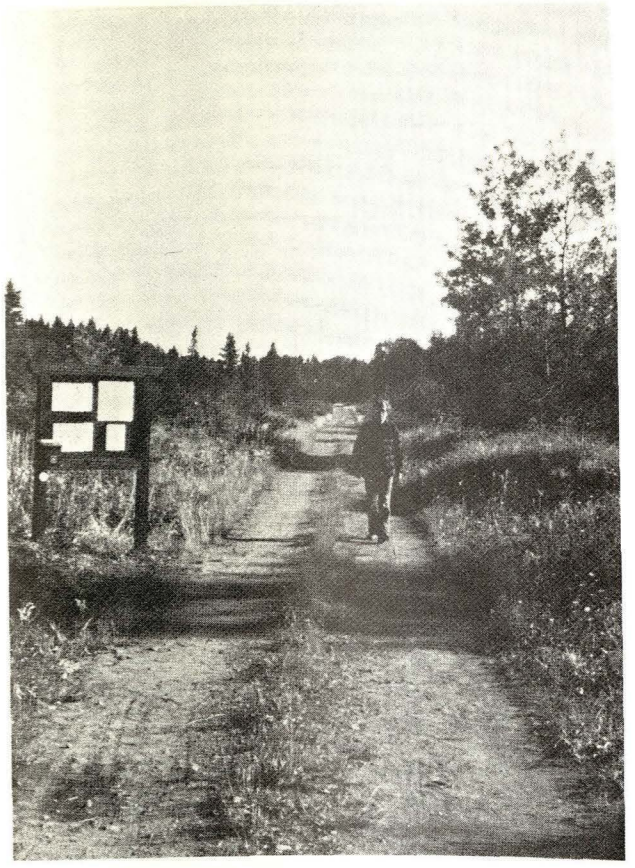

Figure 4.—*The unstaffed trail register was placed along the trail a short distance from the parking area and plainly visible to trail users.*

Figure 5.—*On the bulletin board were registration materials and a box for completed forms, a map of the Forest, rules and regulations, and signs pertaining to registration.*

box. As such, some visitors may have viewed the system as a simple trail register with an authoritarian message.

The self-issued voluntary registration used the nonauthoritarian approach, and the sign was more solicitous: "One Person From Each Group **Please Register** Here." After completion, the entire voluntary form was to be deposited at the register.

Registration signs, forms, and instructions were rotated each Wednesday. At all times, as an incentive for registering, a free map of the Ottawa National Forest, was offered. A sign (fig. 5) advising people of the map was on the bulletin board: "For Your Cooperation A Free Map of the National Forest is Available—Please Take Only One Map per Group." Maps were stored in the top half of the registration box.

To monitor compliance and the effects of the two registration signs, an electric-eye trail traffic-counter and a super-8 movie camera system developed by the Forest Service's Equipment Development Center in Missoula, Montana (Gasvoda 1978) were used. The camera and counter were located out of sight and camouflaged as much as possible (fig. 7). The equipment was mounted on a tree with lag bolts, which were removed when the study was completed, leaving several small, readily healable wounds.

The trail counter emits a narrow beam of invisible infrared light that bounces off a retro-reflector on the trail register (fig. 8). Interruptions in the beam activated the camera for 40-seconds, exposing one frame every 2 seconds. (The camera could be set to run up to 252 seconds and to expose one frame every 2 to 30 seconds.) The camera used 50-foot standard cartridge type color film containing 3,600 frames per roll. Exposure speed and the camera's field of view insured that few if any groups could walk on the trail without being photographed. Because the trail was fairly wide (fig. 4), there was little reason for visitors to wander off the trail and not trigger the monitoring system. This indeed was confirmed by observing groups using the trail in 1978.

MANDATORY FORM

Self-Issuing
McCORMICK PERMIT

Name _____

Address _____

City _____ State _____ Zip _____

To visit _____
(Name of Area)

Today's date: month _____ day _____

The time, now: _____ am / pm

Location of entry _____

Location of exit _____

Number of people in group _____

Number of watercraft _____

I agree to abide by all laws, rules, and regulations which apply to this area. I will do my best to see that everyone in my group does likewise.

_____ _____
(Date) (Signature)

Keep the white copy in your possession while in McCormick. Please place yellow copy in slot in box.

Approved OMB No. 40-R3856

VOLUNTARY FORM

McCORMICK
REGISTRATION CARD

_____

COMPLETE THIS CARD
AND PLACE IN SLOT IN BOX

_____

ONLY ONE person from each group needs to complete card. Please answer ALL questions.

Name _____

Address _____

City _____

State _____ Zip _____

Today's
Date: month _____ day _____

The time, now: _____ am / pm

Location of entry _____

Location of exit _____

Number of people in your group _____

Number of watercraft _____

Approved OMB No. 40-R3856

Figure 6.—*Registration forms used at trail register in the McCormick Experimental Forest, 1978 and 1979.*

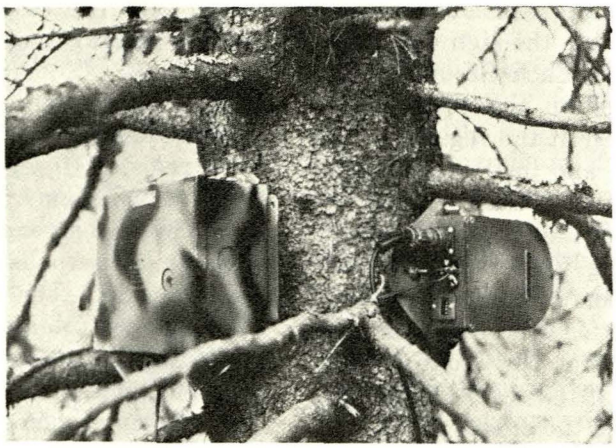

Figure 7.—*A spruce tree was used as concealment for the camera (on the left) and trail counter (on the right) used in the study.*

Figure 8.—*The retro-reflector used with the monitoring equipment was placed on a leg of the bulletin board under the registration box. A person walking past the trail register or stopping to register would break the invisible beam and activate the camera.*

The camera system automatically exposed one frame each hour (day **and** night) while turning on an internal red light to indicate the passage of time. This innovation is used to estimate when use occurs each day and how long people stay who enter and exit at the same location. The system ran on 12-volt batteries and was checked on Wednesdays, Saturdays, and Sundays.

In our study, a roll of film lasted about 10 days. About 3 hours were required to tabulate and analyze the information from each film. Registration forms were compared with the information on film to determine compliance or noncompliance. Comparisons were rechecked at least once to assure the reliability of results. Visitors were classified as complying with the registration requirement if they completed the necessary forms on either their way into or out of the area. (More than 95 percent of the 214 groups registering filled out the forms when they entered.)

In addition to confirming compliance and noncompliance, information was recorded from the film for all groups regarding: (1) entry hour, (2) approximate number of hours in the area (possible only for people using the same entry and exit point), (3) day of visit—weekday, Saturday, Sunday or national holiday, (4) month of visit, (5) group size, and (6) the apparent activity or activities the group pursued such as general hiking, berry-picking, fishing, hunting, and camping (even though camping is prohibited, some groups did stay overnight). This information was used to determine whether groups that registered differed from groups that did not register.

The use of cameras to monitor vehicular and recreational traffic is legal according to Forest Service legal counsel. To preserve the privacy of visitors, the camera was located far enough from the trail register that individuals could not be identified. Also, the film was viewed only by authorized personnel and destroyed after the necessary information was recorded on use patterns and registration compliance. Further, we informed administrators of the Ottawa National Forest that such information would not be made available to them as evidence against persons suspected of violating regulations of the McCormick Experimental Forest.

A field observer monitored the system during most of August 1978 and July 1979 to evaluate the equipment effectiveness and to compare actual use with the information on film. In July 1979, the observer solicited opinions of people from 12 groups about the self-registration procedures. Although this was not a primary objective of the study and the sample was not representative of all Forest visitors, their responses gave some insight regarding self-registration as a means of collecting recreational use information.

RESULTS AND DISCUSSION

Performance of Equipment

As the study began we suspected that the mandatory requirement might antagonize some people and lead to retaliatory vandalism of the bulletin board register or the use monitoring equipment. However, there was no vandalism of any kind. Locating the register uptrail from, and out of sight of, the main road and parking lot may have helped prevent vandalism (fig. 4). At least 10 groups found the equipment, but no one disturbed it. In fact, two groups left notes of inquiry attached to the equipment. In future applications we suggest an inconspicuous note be

attached to the use monitoring equipment explaining what the equipment is, its purpose, and whom to contact for further information.

The monitoring equipment and the trail register performed almost faultlessly. Although it was time-consuming and required two people to line up the trail counter and the retro-reflector, once in place the system worked well. It should be noted, however, that if the counter is mounted on a tree trunk with lag bolts, as was done in this study, the counter will shift slightly within the first day or two as a natural response to the wound (fig. 7), necessitating realignment of the counter and reflector. Once this realignment was done there were no further problems.

We also experienced some inconvenience when wind caused the limbs of the spruce tree in which the camera and counter were located to activate the equipment. This was the result of the equipment placement and not of the equipment itself. Overall the effect was small, and less than 10 percent of the film was "lost" on any given roll.

Our study originally intended to use the equipment during late fall and winter to study cross-country skiers. However, at temperatures below 10°F the equipment functioned sporadically. Below zero, the equipment ceased to function. We did not experiment with different power sources or lubricants that may have facilitated cold weather operation.

During the study period, 324 groups were recorded as visiting the Forest—57 percent came when the self-issued voluntary registration requirement was in effect; 43 percent when the mandatory requirement was used.

Overall Compliance

Overall, we judged unstaffed trail registers to be effective in securing information about trail use of the McCormick Experimental Forest. Both the self-issued voluntary and the self-issued mandatory registration approaches elicited high compliance. Seventy percent of the groups entering the area under the self-issued voluntary requirement complied and the mandatory approach requirement elicited a 61 percent compliance rate.

Factors Influencing Compliance

Time of day the visit began

Generally, the time of day visits began was not related to registration compliance, except after 6 pm when visitation (4 percent of visits) and compliance (30 percent) both were low. However, in comparing the two registration forms—voluntary and mandatory—there was a significant difference ($p<0.05$) in compliance depending on the time of day the visit began (table 1). When the voluntary form was used, the rate of compliance was fairly stable throughout the day with the mid-day period—noon to 2 pm—having the highest compliance rate. When the mandatory registration form was used, the compliance rate was low in the morning (7 to 12 am) and the afternoon (2 to 6 pm), but during the mid-day period it was similar to the rate for the voluntary form. After 6 pm there was a precipitous drop both in visits and in compliance regardless of the approach used.

Because registration compliance was highest during the mid-day period when there were more people present, we believe the perceived forces of "peer pressure," whether real or imaginary, induced people to comply. This contention receives further support because groups arriving after 6 pm, when few groups are present, tended to comply at a lesser rate. Also, the likelihood of management personnel being present to check for violators was greater during the mid-day period and people may, therefore, have felt more obliged to register.

Length of stay

In general, length of stay was not statistically related to compliance. On the average each group

Table 1.—*Registration compliance by time of day group entered the McCormick Forest under voluntary and mandatory registration requirements, 1978-1979*

Type of registration requirement	Time of day									
	7 am to 12 noon		12 noon to 2 pm		2 pm to 6 pm		After 6 pm		Totals	
	Observed	Registered	Observed	Registered	Observed	Registered	Observed	Registered	Observed	Registered
	No.	*Percent*	*No.*	*Percent*	*No.*	*Percent*	*No.*	*Percent*	*No.*	*Percent*
Voluntary	65	69	70	74	45	71	4	0	184	70
Mandatory	55	56	51	72	26	58	8	25	140	61
Total	120	63	121	74	71	66	12	17	324	66

stayed in the Forest 3 hours. However, those identified on the film as hunters remained longer than other people, averaging about 3½ hours. Among hunters there was a statistical relation between compliance and length of stay ($p<0.05$). Hunting groups that registered stayed in the Forest an average of 3 hours and 45 minutes, whereas hunting groups that did not register stayed, on the average, 3 hours.

Season of visit

During the spring (May) and fall (September and October) visitors were less likely ($p<0.05$) to register than were summer visitors (table 2). Slightly more than half the spring (58 percent) and fall (57 percent) visitors complied compared to nearly three-fourths of the summer visitors (72 percent).

The seasonal patterns of registration under the two approaches were similar during spring and summer, but differed significantly during the fall. In fall, the voluntary form elicited a 69 percent response compared with only 45 percent for the mandatory approach (table 2).

There are two plausible reasons for the differences in seasonal compliance. First, spring and fall compliance rates may be lower because the number of visitors are comparatively low and groups present may not perceive the need for registration. The lack of people also may lessen the chance that "peer pressure" will influence registration compliance. And, the lack of management personnel during these lower use periods may give some visitors the feeling that if they do not register there will be little chance of being caught. Second, registration compliance rates may be lower in spring and fall because during these periods many recreationists tended to be alone or in groups of two. The lower compliance rate for small groups and lone individuals may be partly explained because many of these people made short visits (shorter than the average for all groups) and perhaps believed registration was not really necessary.

Size of group

The size of the group was statistically related to registration compliance. Eighty-nine percent of the groups with more than four people registered compared to 60 percent of the groups containing less than four people (table 3). The average size of groups registering was 3.5 and those not registering was 2.5 ($p<0.05$). Again, the presence of other people (especially other group members) may have contributed to

Table 2.—*Registration compliance by season for groups visiting the McCormick Forest under voluntary and mandatory registration requirements, 1978-1979*

Type of registration requirement	Seasons						Totals	
	Spring (May 22-31,1979)		Summer (Aug 1978 and June, July, Aug 1979)		Fall (Sept 1978, Sept, Oct 1979)			
	Observed	Registered	Observed	Registered	Observed	Registered	Observed	Registered
	No.	*Percent*	*No.*	*Percent*	*No.*	*Percent*	*No.*	*Percent*
Voluntary	17	59	106	73	61	69	184	70
Mandatory	2	50	82	72	56	45	140	61
Total	19	58	188	72	117	57	324	66

Table 3.—*Registration compliance by group size for groups visiting the McCormick Forest under voluntary and mandatory registration requirements, 1978-1979*[1]

Type of registration requirement	Number of people per group						Total	
	1 to 3 people		4 to 6 people		7 or more people			
	Observed	Registered	Observed	Registered	Observed	Registered	Observed	Registered
	No.	*Percent*	*No.*	*Percent*	*No.*	*Percent*	*No.*	*Percent*
Voluntary	122	63	38	87	17	100	177	72
Mandatory	107	56	26	81	3	100	136	64
Total	229	60	64	84	20	100	313	67

[1]The numbers and percents do not equal total study numbers and percents because the exact size of eleven groups could not be determined.

a higher compliance rate for larger groups. These findings are similar to results from other studies which revealed larger groups tend to register more than smaller groups (Lucas 1975, Lucas *et al.* 1971, Wenger 1964).

Dominant recreation pursuit

Most visitors to the Forest appeared to be hikers. Although camping was not permitted, 7 percent of the groups were identified as staying one or more nights. Interestingly, 31 percent of these camping groups registered and correctly indicated an illegal length of stay!

Other than campers, hunters were the only group easily identified from the film: they represented 9 percent of the visitors. Fewer hunters—48 percent—registered than other recreationists—63 percent ($p<0.05$). Wenger (1964) and Lucas (1975) also found hunters registered less frequently than other recreationists.

Visitor Reaction to Registration Requirements

We asked 12 groups what they thought of the requirement to register before entering the area. Of the groups approached, nine were compliers and three were noncompliers. The compliers were favorable toward registration and believed information on visitor use was necessary to manage the Forest. When noncompliers were asked why they had not registered, two said they had not planned on walking the full length of the trail and felt registration was not necessary. The third group offered no specific reason for not registering.

When asked how the registration system could be improved, five of the groups said they felt an explanatory sign indicating the **purpose** of registration, as well as the **intended use** of the information obtained, would encourage greater compliance. Wenger's (1964) study reinforces this point; he found the most effective sign used on a trail registration station included a short reason for registering.

Management Implications

Unstaffed trail registers can be effective

Unstaffed trail registers can be effective in securing information from trail recreationists. But, before installing trail registers, resource administrators should have a clear understanding of their needs for information about visitor use and how such information will be used. To collect information without clear objectives unnecessarily burdens both the recreating public and recreation administrators. If it is decided that the information is essential to the management of the area, collecting it at unstaffed trail registers has certain advantages. Such a system maybe cheaper to maintain and administer than requiring visitors to go to a central location—visitor center or ranger station—and it is more convenient for the visitors themselves. And, according to our findings, it works. These contentions are supported by our findings and those of other researchers (Wenger and Gregerson 1964, Lucas *et al.* 1971, Godin and Leonard 1977).

If managers are considering using unstaffed trail registers to secure information on recreation use, we suggest they consult reports by Wenger (1964), Lucas (1971), Lucas and Kovalicky (1981), Echelberger *et al.* (1981), and Leonard *et al.* (1980) for information on trail register design, location, wording of signs, types of registration cards, and facility maintenance.

We strongly recommend registers be located up the trail, away from the trailhead and parking area. Such a location is removed from the confusion often associated with these places and from the nontrail users who could wander into the parking area and vandalize the equipment. We further recommend that trail registers be regularly and carefully serviced. Not only does the visitor need all the materials to properly register, but a well maintained facility suggests to the visitor that the registration requirement is viewed by the agency as an important, high priority activity.

Voluntary or mandatory registration: which to use?

Both the voluntary and the mandatory requirement can be successful. However, although the selection of the approach should be tied to area management objectives, we recommend using the voluntary approach where feasible. We feel that the response to the nonauthoritarian approach in our study was better because it was less obtrusive. The more solicitous the approach, the better it may fit with peoples' ideas of enjoying the out-of-doors for the sense of "freedom" it affords. If the voluntary approach is used we suggest the system be monitored regularly for compliance information.

If the mandatory approach is selected, particularly in designated Wilderness areas where accurate, reliable information maybe needed to implement visitor use limits and/or redistribution programs, we strongly suggest the agency periodically monitor compliance. If recreationists perceive the mandatory requirement as not being enforced, the tendency may be not to register. This may be especially true in areas where there is a large amount of repeat use.

Some ways to improve registration compliance

Registration compliance, regardless of approach selected, probably can be increased by judiciously scheduling patrol and maintenance services. We found compliance was notably lower in the morning and late afternoon than at mid-day. In general, compliance was greater when visitors were more numerous. We suspect that "peer pressure" induces people to register. We further believe that if patrols and other management functions were scheduled during lower use periods the mere presence of uniformed or identifiable management personnel might have a positive effect on registration rates.

Getting visitors to recognize and appreciate the importance of registration should increase registration compliance, too. Signs informing people **why** registration is needed seem especially important. Generally, the wording of signs and other instructions should be presented to appeal to people with diverse reasons for visiting the area. However, during periods when one type of use or visitor type dominates, registration requirements may need to be directed specifically to that group. For example, in our study and in others (Wenger and Gregerson 1964) getting hunters to register was a special problem. We know hunters traditionally have been responsive to wildlife management requirements, including regulations and fees. Perhaps an appeal to hunters pointing out the value of registration information to wildlife management might be effective in eliciting higher compliance rates.

LITERATURE CITED

Echelberger, H. E., R. E. Leonard, and H. J. Plumley. 1981. Validation of trailside registration boxes. Journal of Soil and Water Conservation 36(1):53-54.

Gasvoda, David. 1978. Installation and operation of the Canon 814-XL camera traffic classification system. U.S. Department of Agriculture Forest Service Manual, 9 p. Equipment Development Center, Missoula, Montana.

Godin, Victor, and Raymond Leonard. 1977. Permit compliance in eastern wilderness: preliminary results. U.S. Department of Agriculture Forest Service, Research Note NE-238, 3 p. U.S. Department of Agriculture Forest Service, Northeastern Forest Experiment Station, Upper Darby, Pennsylvania.

James, George, and Hans Schreuder. 1972. Estimating dispersed recreation use along trails and in general undeveloped areas with electric-eye counters: some preliminary findings. U.S. Department of Agriculture Forest Service, Research Note SE-181, 8 p. U.S. Department of Agriculture Forest Service, Southeastern Forest Experiment Station, Asheville, North Carolina.

Leonard, R. E., H. E. Echelberger, H. J. Plumley, and L. W. Van Meter. 1980. Management guidelines for monitoring use on backcountry trails. U.S. Department of Agriculture Forest Service, Research Note NE-286, 20 p. U.S. Department of Agriculture Forest Service, Northeastern Forest Experiment Station, Broomall, Pennsylvania.

Lucas, Robert. 1975. Low compliance rates at unmanned trail registers. U.S. Department of Agriculture Forest Service, Research Note INT-200, 6 p. U.S. Department of Agriculture Forest Service, Intermountain Forest and Range Experiment Station, Ogden, Utah.

Lucas, Robert, and Thomas Kovalicky. 1981. Self-issued wilderness permits as a use measurement system. U.S. Department of Agriculture Forest Service, Research Paper INT-270, 18 p. U.S. Department of Agriculture Forest Service, Intermountain Forest and Range Experiment Station, Ogden, Utah.

Lucas, Robert, and Robert Rinehart. 1976. The neglected hiker. Backpacker Magazine 4(1):35-39.

Lucas, Robert, Hans Schreuder, and George James. 1971. Wilderness use estimates: a pilot test of sampling procedures on the Mission Mountain Primitive Area. U.S. Department of Agriculture Forest Service, Research Paper INT-109, 44 p. U.S. Department of Agriculture Forest Service, Intermountain Forest and Range Experiment Station, Ogden, Utah.

U.S. Department of Interior, Bureau of Outdoor Recreation. 1967. Outdoor recreation trends. 24 p. Washington, D.C.

U.S. Department of Interior, Bureau of Outdoor Recreation. 1973. Outdoor recreation: a legacy for America. 89 p. Washington, D.C.

Wenger, Wiley, Jr. 1964. A test of unmanned registration stations on wilderness trails: factors influencing effectiveness. U.S. Department of Agriculture Forest Service, Research Paper PNW-16, 48 p. U.S. Department of Agriculture Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Wenger, Wiley, Jr., and H. M. Gregerson. 1964. The effect of nonresponse on representativeness of wilderness trail register information. U.S. Department of Agriculture Forest Service, Research Paper PNW-17, 20 p. U.S. Department of Agriculture Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Leatherberry, Earl C., and David W. Lime.

1981. Unstaffed trail registration compliance in a backcountry recreation area. U.S. Department of Agriculture Forest Service, Research Paper NC-214, 11 p. U.S. Department of Agriculture Forest Service, North Central Forest Experiment Station, St. Paul, Minnesota.

Presents findings from a study in Michigan's Upper Peninsula to evaluate the effectiveness of unstaffed trail registration stations to obtain recreation use information. Two registration approaches were evaluated: (1) self-issued voluntary registration form, and (2) self-issued mandatory registration form. The paper also cites factors influencing registration compliance and gives implications for management.

KEY WORDS: Self-registration, recreation use management, remote sensing.